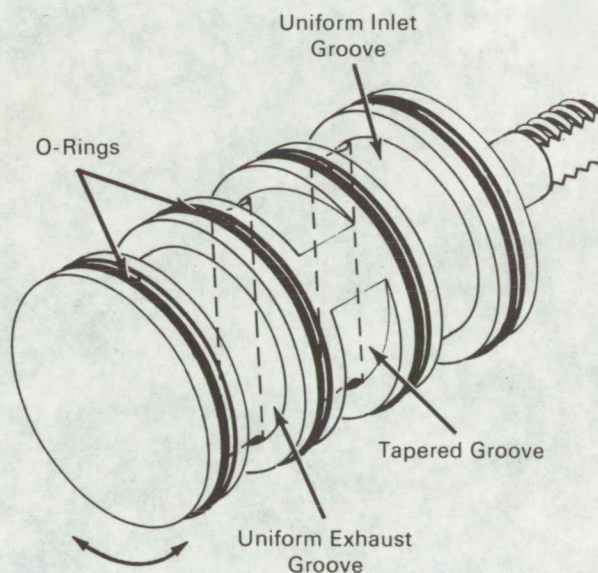
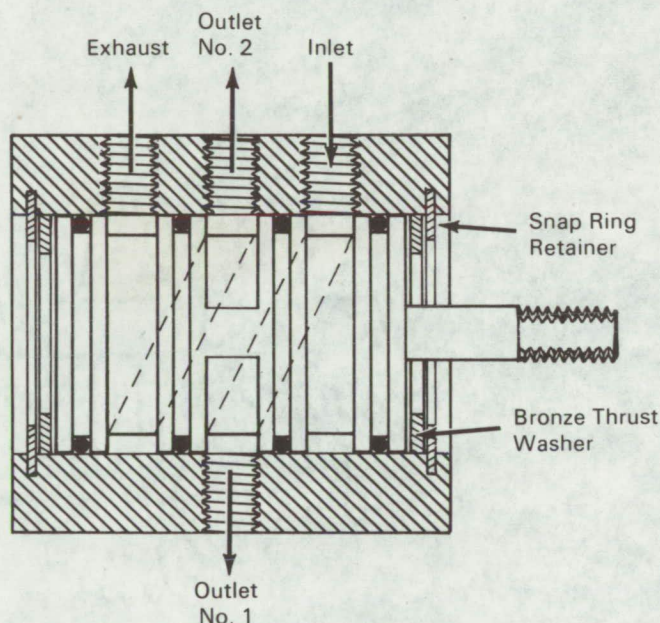


NASA TECH BRIEF



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Four-Way, Full-Throttling Valve Concept



This rotary, four-way valve is proposed as a means of regulating the flow of a fluid (gas or liquid) over the limits from full flow in one direction to full flow in the opposite direction. At the midpoint valve position between these limits both flow paths are closed. Conventional four-way valves are snap-acting and are unsuitable for throttling service. The proposed valve has 90 degrees of travel for each flow direction, with a gradually increasing port size on both flow paths which should result in good throttling characteristics.

The valve consists of a machined cylinder mounted to rotate within a block having an inlet port, two outlet ports, and an exhaust port. One circumferential groove of uniform diameter in the cylinder lines up with the inlet port in block, and a similar groove

lines up with the exhaust port. O-ring seals are positioned on each side of both grooves. Between these grooves is a section having two tapered circumferential grooves on diametrically opposite sides of the cylinder. These tapered grooves are bounded by two full-diameter segments to seal off the outlets in the block when the cylinder is in midposition (valve closed). One tapered groove is drilled to provide a passage into the exhaust groove, and the other tapered groove is drilled to provide a passage into the inlet groove. With this configuration, rotation of the valve cylinder from the closed midposition will expose the outlet ports in the block to the gradually increasing port areas provided by the tapered grooves communicating with the inlet and exhaust ports. An opposite rotation from the closed position will reverse

(continued overleaf)

the relationship of the outlet ports to inlet and exhaust ports.

Valves of this design could be used with air motor drives where precise speed control in forward and reverse is desired. Since both flow paths are throttled together, moving the valve toward midpoint would have a braking effect, preventing coasting; at midpoint, the motor would lock. Further rotation would create compression in one line and vacuum in the other line, thus providing resistance to rotation.

Notes:

1. This valve design would be adaptable to hydraulic and pneumatic applications.

2. The shape of the taper on the cylinder could be varied to give different flow characteristics, and the length of the valve could be increased to provide for additional ports.
3. This valve is only in the conceptual stage; neither a model nor prototype has been built as of the date of this Tech Brief. No further documentation is available.

Patent status:

No patent action is contemplated by NASA.

Source: J. S. Shockey of
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